A rare and endangered new subspecies of *Eucalyptus sargentii* (Myrtaceae) with high potential for revegetation of saline sites from south-western Australia and notes on *E. diminuta* and *E. sargentii* subsp. *fallens*

D. Nicolle

School of Biological Sciences, The Flinders University of South Australia,
GPO Box 2100, Adelaide 5001, South Australia

Abstract

Nicolle, D. A rare and endangered new subspecies of *Eucalyptus sargentii* (Myrtaceae) with high potential for revegetation of saline sites from south-western Australia and notes on *E. diminuta* and *E. sargentii* subsp. *fallens*. *Nuytsia* 15(3): 395–402 (2005). *Eucalyptus sargentii* subsp. *onesia* Nicolle *subsp. nov.* is described. It is known from less than ten small populations in the central wheatbelt of south-west Western Australia, with all populations occurring on highly saline sites and possibly endangered by increasing salinisation. *E. sargentii* subsp. *onesia* differs from subsp. *sargentii* primarily in the lignotuberous, mallee habit, making it preferable to subsp. *sargentii* for salt reclamation projects, due to its propensity to regenerate following fire or cutting. Extensive field examination, seedling trials and observations of cultivated material have indicated that *E. sargentii* subsp. *fallens* is not specifically distinct from *E. diminuta* and I regard the former as synonymous with the latter. *E. diminuta* is recircumscribed to include populations from Eurardy Station in the north to near Watheroo in the south.

Introduction

Recent field research of *Eucalyptus sargentii* and *E. diminuta*, combined with seedling studies of these species and observations of cultivated material over a number of years (Nicolle 2000), has indicated that the recognition of three taxa (*E. diminuta* and *E. sargentii* with subspp. *sargentii* and *fallens*) is not indicative of the variation within the two species nor of the relationship between the three taxa.

While two subspecies within *E. sargentii* have been recognized (Hill & Johnson 1992), I regard subsp. *fallens* as within the variation seen in *E. diminuta* and recircumscribe *E. diminuta* to include both newly-collected populations and populations previously attributable to *E. sargentii* subsp. *fallens*.

Aside from *E. sargentii* subsp. *fallens*, field surveys have indicated two variants of *E. sargentii*, a non-lignotuberous mallet and a lignotuberous mallee. This latter variant is described as a new subspecies. The new subspecies is numerically rare, but has a high potential for use in the revegetation of saline sites in the wheatbelt of Western Australia.

Taxonomy

E. sargentii and *E. diminuta* are part of *Eucalyptus* ser. *Erectae* subser. *Pedicellatae,* along with *E. astringens, E. aspratilis, E. occidentalis, E. stowardii, E. sporadica* and *E. thamnoides.* The classification and distinguishing features of this subseries within *Eucalyptus* are as follows (modified from Brooker 2000).

E. subg. *Symphyomyrtus* (Schauer) Brooker – cotyledons folded in seeds; buds bi-operculate; seeds with ventral or terminal hilum; seed coat formed from both integuments.

E. sect. *Bisectae* Maiden ex Brooker – Cotyledons bisected; inflorescences axillary.

E. subsect. *Glandulosae* Brooker – Pith of branchlets with glands.

E. ser. *Erectae* Brooker – Mallees or mallets; inflorescences single in axils; operculum long; staminal filaments erect.

E. subser. *Pedicellatae* Blakely – Leaf oil glands not obscuring secondary venation; peduncle flattened or terete; buds held loosely.

This treatment deals only with *E. sargentii* and *E. diminuta.* These two species, along with *E. stowardii*, can be distinguished from the other taxa of the subseries by the terete to angular and parallel-sided peduncles (flattened and distally broadened in the other taxa). *E. stowardii* differs from both *E. diminuta* and *E. sargentii* in the broader, thicker and much glossier adult leaves (to 30 mm wide); the broader, distinctly ribbed buds with a more obtuse operculum and the larger, ribbed fruits (to 15 mm long x 13 mm wide).

Both *E. sargentii* (especially subsp. *onesia*) and *E. diminuta* could be confused with *E. sporadica*, but the latter can be distinguished by the larger (longer and broader) adult leaves, the flattened and distally broadened peduncles and the larger, often less obconical fruit. *E. sporadica* occurs to the south and east of the distribution of *E. sargentii* subsp. *onesia* and *E. diminuta*, but overlaps the distribution of *E. sargentii* subsp. *sargentii*, being ecologically separated (the mallee *E. sporadica* occurring on well-drained sands or gravelly loams, often in minor creek lines; the mallet *E. sargentii* subsp. *sargentii* being restricted to lowland saline sites).

Eucalyptus sargentii Maiden, *Critical Revision of the Genus Eucalyptus* 7: 58 (1924).

Type: Meare Lake, W.A., Sept. 1910, *O.H. Sargent* 707 (*holo:* NSW; *iso:* CANB).

The non-lignotuberous, obligate seeder variant of *E. sargentii* occurs at the type locality of Lake Meares, in the Salt River valley between Quairading and Brookton, W.A.

E. sargentii is distinguished within *E.* subser. *Pedicellatae* by its combination of narrow, linear juvenile leaves, narrow adult leaves, terete peduncles and pedicels and small buds and fruit. *E. sargentii* is distinguished from *E. diminuta* by the narrower, linear seedling leaves, the narrower adult leaves and the smaller buds and fruits.

Tree without a lignotuber (mallet), or *mallee* with a lignotuber. *Bark* rough on trunk(s) up to 4 metres or completely smooth; rough bark ribbony or flaky-fibrous, dark grey to dark grey-brown; smooth bark decorticating in strips, ±glossy, grey to light grey-brown over pink, orange or coppery. *Branchlets* non-pruinose, pith glands present. *Seedling leaves* distinctly petiolate, disjunct from pair 2–4, linear or linear-falcate, 40–80 mm long x 5.5–6.5 mm wide, concolorous to weakly discolorous, non-pruinose, dull, pale green to slightly blue-green. *Adult leaves* disjunct, narrow-lanceolate, petiole 8–12 mm long; lamina 45–80 mm long x 5–10(–14) mm wide, concolorous, slightly glossy and somewhat blue-green at first, maturing glossy, green to dark olive-green; reticulation sparse to moderately sparse; island oil glands moderately dense but not obscuring secondary venation. *Inflorescence* axillary, single, loosely pendulous; peduncles terete, slightly distally broadened, 11–16 mm long; pedicels terete, 3–7 mm long. *Flower buds* 14–24 mm long x 3–5 mm wide, hypanthium smooth, cylindrical to obconical; operculum smooth, cylindrical-horn-shaped, 9–19 mm long. *Flowers* white; stamens erect in bud, all fertile; anthers versatile. *Fruits* smooth, slightly campanulate to obconical, 6–10 mm long x 5–9 mm wide, operculum scar level to slightly ascending, 1–1.5 mm wide; disc descending, *c.* 1 mm wide; valves 4, slightly spreading, at rim level to exserted. *Seed* grey-brown to red-brown, compressed-ovoid, reticulation shallow.

There are two subspecies, both restricted to locally low-lying and highly saline sites, typically fringing salt lakes or in broad saline valley flats.

Notes. E. sargentii is closely related to *E. stowardii* and *E. diminuta* and is most reliably distinguished from both these species by the narrow, linear juvenile leaves compared with the broader, lanceolate juvenile leaves of the latter two species. *E. sargentii* also differs in the smaller adult leaves, buds and fruits in relation to these two species.

The presence of rough bark in both subspecies of *E. sargentii* (as well as in *E. diminuta*) is variable and is apparently dependent on stem diameter and thus plant size and maturity. Mature individuals of subsp. *sargentii* are usually rough-barked on the lower trunk due to their larger stature compared with subsp. *onesia*. However, a completely smooth-barked population of large-sized subsp. *sargentii* is known (*D. Nicolle* 4412 *& M.I.H. Brooker*; 2.7 km E of Koorikin Rd on Kondinin – Corrigin Rd, W.A.).

Two subspecies are recognised differing primarily in regenerative strategy and plant form. Hybrids and intergrades between the subspecies are not known.

Key to the subspecies of *E. sargentii*

1. Obligate seeder; lignotuber absent; tree ..... **subsp. sargentii**
1. Resprouter; lignotuber present; mallee ..... **subsp. onesia**

Eucalyptus sargentii subsp. **sargentii**

Distinguished from subsp. *onesia* by the absence of a lignotuber and the erect tree (mallet) habit.

Mallet, usually erect-stemmed and with a terminal crown, 5 to 12 metres tall. Lignotuber absent. *Bark* persistent and rough on the trunk for one to four metres, flaky-fibrous; smooth above, decorticating in ribbony strips; very rarely smooth-barked throughout.

Specimens examined (north to south): WESTERN AUSTRALIA: Damboring East Rd, S of Pithara, 30° 28'59"S, 116° 44'23"E, 3 Aug. 2002, *D. Nicolle* 4443 & *M. French* (CANB, PERTH); S of Koorda towards Wyalkatchem, 30° 47'57"S, 117° 19'15"E, 19 Apr. 1998, *D. Nicolle* 2229 (PERTH); private property 5.8 miles NE of Hines Hill, 25 Nov. 1970, *J. Baker 135* (AD, CANB); Rabbit-proof fence, 2.7 miles E Cunderdin, 12 May 1967, *G. Chippendale* 77 (AD, CANB); 9 km E of Quairading towards Yoting, 4 Oct. 1975, *M.I.H. Brooker* 5000 (AD, CANB, PERTH); 6 km W of Quairading–Corrigin Rd on Beverley East Rd, 23 Aug. 1988, *M.I.H. Brooker* 10040 (AD, CANB, PERTH); salt flats just E of Wave Rock Caravan Park, *c.* 4 km ENE of Hyden, 11 Nov. 1983, *L. Haegi* 2622 & *P.S. Short* (AD, PERTH); 2.7 km E of Koorikin Rd on Kondinin–Corrigin Rd, 32° 27'07"S, 118° 10'07"E, 29 July 2002, *D. Nicolle* 4412 & *M.I.H. Brooker* (CANB, PERTH); 7.9 km W of Pingaring, 21 Oct. 1986, *M.I.H. Brooker* 9478 (AD, CANB, PERTH); edge of *Eucalyptus mimica* subsp. *continens* type population, S of Newdegate, 33° 17'07"S, 119° 01'23"E, 22 Nov. 1994, *D. Nicolle* 1115 (PERTH). 0.9 km N on Aylemore Rd, 4 May 1988, *M.I.H. Brooker* 9947 (AD, CANB, PERTH).

Distribution and habitat. Distributed from south of Pithara in the north-west to south-east of Newdegate in the south-east. Its distribution is to the east of subsp. *onesia* and to the south and east of *E. diminuta*. Associated eucalypts include *E. celastroides* subsp. *virella, E. loxophleba* subsp. *loxophleba, E. mimica* subspp. *continens* and *mimica* and *E. spathulata* subsp. *salina.* (Figure 1)

Conservation status. E. sargentii subsp. *sargentii* is widespread and while of scattered occurrence, is locally common and sometimes dominant. While not under short-term threat, the subspecies' distribution at the fringes of salt lakes and otherwise low-lying, saline areas, places this subspecies under longer-term risk of increased salinisation, despite its reputed salt tolerance.

Eucalyptus sargentii subsp. **onesia** Nicolle *subsp. nov.*

Affinis *E. sargentii* subspeciei *sargentii* sed habitu pluricauli ('mallee') et praesentia lignotuberis differt. Affinis *E. diminutae* subspeciei *fallenti* sed foliis adultis angustioribus minoribusque et alabastris fructibusque minoribus differt.

Distinguished from subsp. *sargentii* by the presence of a lignotuber and the spreading, dense mallee habit.

Type: WESTERN AUSTRALIA: Cunderdin to York Rd, 31° 49'41"S, 117° 08'09"E, 19 Apr. 1998, *D. Nicolle* 2238 (*holo:* PERTH 05227038; *iso:* AD, CANB).

Mallee of dense and spreading habit, four to six metres tall. Lignotuber present. *Bark* often smooth throughout, decorticating in ribbony strips; sometimes with some persistent, ribbony rough bark at the base to up to one metre.

Specimens examined (north to south): WESTERN AUSTRALIA: N of Yerecoin towards Piawaning, 30° 54'09"S, 116° 23'15"E, 13 Jan. 2001, *D. Nicolle* 3696 & *M. French* (CANB, PERTH); cnr Westlake Rd and Carani East Rd, NE of Calingiri, 30° 59'51"S, 116° 32'08"E, 13 Jan. 2001, *D. Nicolle* 3695 & *M. French* (AD, CANB, PERTH); 11.8 km E of rail crossing at Carani, 26 Aug. 1982, *M.I.H. Brooker* 7582, 7583 (AD, CANB, PERTH); 12 km E of Carani Siding, 9 km NW of Nitty Marra Hill, 26 Aug. 1982, *S.D. Hopper* 2478A (PERTH); 7.6 miles E of Carani, 22 Sep. 1989, *B.H. Smith* 1224 (BRI, CANB, HO, PERTH); Mortlock River North crossing on Bolgart East Rd, 3 Sep. 1987, *M.I.H. Brooker* 9750 (CANB, PERTH); Mortlock River E branch, 2 km N of Great Eastern Highway on Hopkins Rd, 9.5 km from Meckering towards Cunderdin,

31°36'31"S, 117°06'13"E, 24 Mar. 2001, *M. French* 1280 (AD, PERTH); Near Meckering on Great Eastern Highway, 31°39'22"S, 116°59'11"E, 30 Sep. 2000, *D. Nicolle* 3456 & *M. French* (CANB, PERTH); 3.3 km SW of Meckering, 4 May 1987, *M.I.H. Brooker* 9587 (AD, CANB, PERTH).

Distribution and habitat. Restricted to seven known populations in the central wheatbelt of Western Australia. These populations occur in an approximate north-south line from Piawaning south-south-east to between York and Cunderdin, over a linear range of approximately 120 km. This is to the west and disjunct from *E. sargentii* subsp. *sargentii*. All seven populations occur as pure stands in depressions or broad drainage lines that vary from slightly to highly saline. Abutting vegetation on slightly higher and less saline sites is woodland of *E. loxophleba* subsp. *loxophleba, E. myriadena* or *E. wandoo* subsp. *wandoo*. (Figure 1)

Conservation status. All the known populations of this taxon occur on road or rail verges or on adjacent private farmland. The smallest population (north of Yerecoin) consists of only one or two apparent individuals while several populations consist of 20 to 50 apparent individuals. Given the small population sizes, the land tenure on which they occur, and the threat to these populations from salinity and destruction from farm or roadside clearing, the taxon requires further survey to determine its conservation status and whether it should be included on Western Australia's Schedule of Declared Rare Flora. Current status – Conservation Codes for Western Australian Flora: Priority One.

Etymology. From the Greek *onesis* (advantage; use) referring to the potential this subspecies has for reclamation of saline sites, particularly in the central wheatbelt of Western Australia.

Notes. This taxon appears to have been previously unrecognized because historically, accurate assessment of habit and lignotuber variation in the species has been overlooked, and because herbarium specimens of subsp. *onesia* are indistinguishable from subsp. *sargentii*.

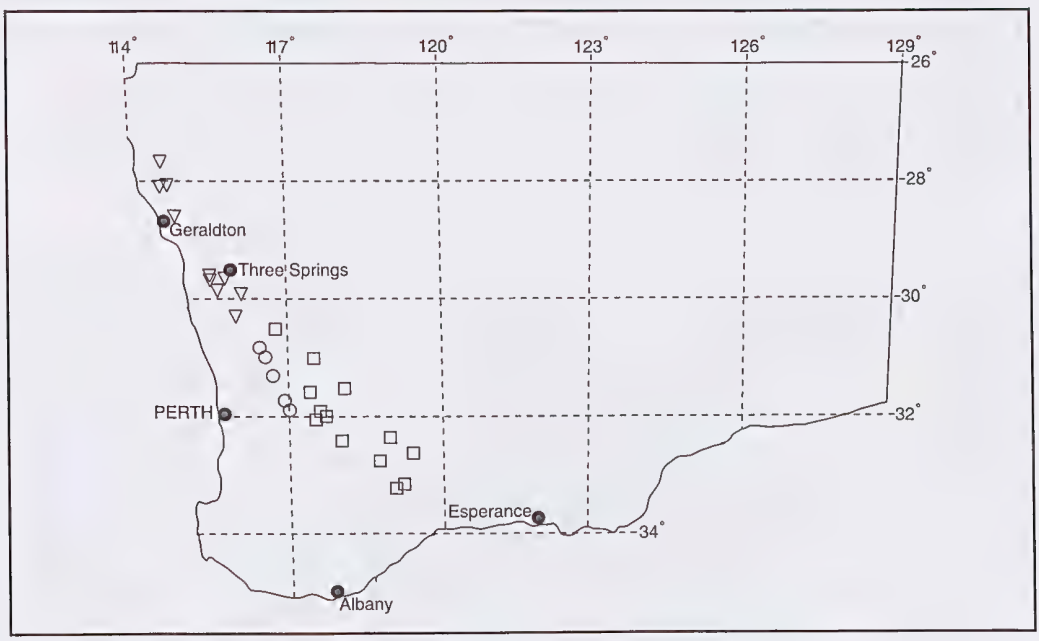

Figure 1. Map of Western Australia below 26°S, showing the distribution of: *Eucalyptus diminuta* ∇, *Eucalyptus sargentii* subsp. *sargentii* □ and *Eucalyptus sargentii* subsp. *onesia* ○.

Eucalyptus diminuta Brooker & Hopper, *Nuytsia* 14(3): 358 (2002).

Type: Yuna Rd, 28° 42' S, 114° 40' E, W.A., 4 Nov. 1985, *M.I.H. Brooker* 9061 (*holo:* PERTH 1066846; *iso:* CANB, NSW).

Eucalyptus sargentii subsp. *fallens* K.D. Hill & L.A.S. Johnson, *Telopea* 4(4): 575 (1992).

Type: 3 km N of Binnu on Highway 1, W.A., 21 Nov. 1986, *K.D. Hill* 2565, *L.A.S. Johnson, D.F. Blaxell & M.I.H. Brooker* (*holo:* NSW; *iso:* PERTH 05966035).

E. diminuta is distinguished within *E.* subser. *Pedicellatae* by its combination of lignotuberous, mallee habit; lanceolate to ovate juvenile leaves; small, lanceolate adult leaves and terete to slightly distally flattened peduncles and pedicels.

E. diminuta is distinguished from *E. sargentii* by the broader, ovate to lanceolate seedling leaves, the broader adult leaves and the larger buds and fruits.

Mallee, 3–6 metres tall; lignotuber present. *Bark* smooth throughout, decorticating in strips, ±glossy, grey to grey-brown over cream to reddish or orange-tan (coppery); rarely with some ribbony or flaky rough bark near the base of the stems. *Branchlets* non-pruinose, pith glands present. *Seedling leaves* distinctly petiolate, disjunct from pair 2–4, ovate to broad-lanceolate, later becoming lanceolate, 40–70 mm long x 14–20 mm wide, concolorous to weakly discolorous, non-pruinose, dull to very slightly glossy, green to blue-green. *Adult leaves* disjunct, lanceolate, petiole 12–16 mm long; lamina 55–115 mm long x (8–) 10–20 mm wide, concolorous, glossy, slightly blue-green at first, maturing slightly blue-green to olive green; reticulation sparse to scattered; island oil glands moderately dense but not obscuring secondary venation. *Inflorescence* axillary, single, loosely pendulous; peduncles terete to moderately flattened, slightly to moderately distally broadened, 14–26 mm long; pedicels terete, 4–18 mm long. *Flower buds* 20–26 mm long x 4–5 mm wide, hypanthium smooth to weakly striate, cylindrical; operculum smooth to weakly striate, cylindrical to horn-shaped, 12–18 mm long. *Flowers* white; stamens erect in bud, all fertile; anthers versatile. *Fruits* smooth to weakly striate, campanulate, 11–13 mm long x 9–12 mm wide, operculum scar level to slightly ascending, 1–2 mm wide; disc descending, *c.* 1 mm wide; valves 4, slightly spreading, at rim level to exserted. *Seed* grey-brown, compressed-ovoid, reticulation shallow.

Specimens examined (north to south): WESTERN AUSTRALIA: Bungabandi Creek, 9 Oct. 1986, *M.I.H. Brooker* 9471, 9472 (AD, CANB, PERTH); W of Eurardy, 24 Aug. 1969, *D.J. Carr & S.G.M. Carr* 962, 963 (AD, CANB); ca. 3 km N of Binnu on NW Coastal Hwy, 28° 00' 38"S, 114° 40' 24"E, 27 Nov. 1994, *D. Nicolle* 1168 (PERTH); 3 km N of Binnu, 11 June 1985, *M.I.H. Brooker* 9036 (AD, CANB, PERTH); S side of salt lake 3 km N of Binnu, 4 Nov. 1985, *M.I.H. Brooker* 9063 (AD, CANB, PERTH); pass NE of Geraldton on Yuna Rd, 11 June 1985, *M.I.H. Brooker* 9038 (AD, CANB, PERTH); Yuna Rd, 28° 42' 06"S, 114° 41' 42"E, 12 Dec. 1992, *D. Nicolle* 271 (PERTH); 7.7 km from Geraldton – Northampton Rd on Yuna Rd, 30 Oct. 1984, *M.I.H. Brooker* 8721 (AD, CANB, PERTH); 8 km NE of Geraldton on Nabawa Rd, 28 May 1983, *D.F. Blaxell* 1995 (AD, CANB, MEL, NSW, PERTH); Mindaloo Beacon, 29° 33' 23"S, 115° 27' 06"E, 29 Oct. 2000, *D. Nicolle* 3544 & *M. French* (PERTH); W side of Mindaloo Beacon Hill, 21 Apr. 1988, *M.I.H. Brooker* 9938 (AD, CANB, PERTH); 13.1 km SW of Three Springs towards Eneabba, 21 Nov. 1986, *M.I.H. Brooker* 9554 (AD, CANB, PERTH); SW of Three Springs on Eneabba Rd, 29° 35' 45"S, 115° 41' 02"E, 4 Feb. 2001, *D. Nicolle* 3767 & *M. French* (CANB, PERTH); SW of Three Springs, 1 Nov. 1984, *M.I.H. Brooker* 8735, 8736 (AD, CANB, PERTH); 2.1 km from Skipper Rd on Bunny Rd, 29° 36' 20"S, 115° 25' 53"E, 4 Feb. 2001, *D. Nicolle* 3770 & *M. French* (AD, CANB, PERTH); Mingenew – Eneabba Rd, 28 May

1983, *D.F. Blaxell* 1995 (AD, CANB, NSW, PERTH); 34.5 km from Three Springs on Eneabba–Mingenew Rd, 24 Oct. 1980, *M.D. Crisp* 7092 (AD, CANB, MEL, NSW, PERTH); 1.0 km from South Waddi Rd on Old Watheroo Rd, 29° 55' 17"S, 116° 05' 58"E, 4 Feb. 2001, *D. Nicolle* 3764 & *M. French* (AD, CANB, PERTH); N of Watheroo, 30° 16' 20"S, 116° 02' 23"E, 13 Jan. 2001, *D. Nicolle* 3697 & *M. French* (CANB, PERTH).

Distribution and habitat. Distributed from Eurardy Station (between Geraldton and Shark Bay) southwards to near Watheroo. This distribution is more extensive than that described for *E. diminuta* by Brooker and Hopper (2002) because of the inclusion of populations previously attributed to *E. sargentii* subsp. *fallens* and other, recently recognised southerly populations. *E. diminuta* occupies a range of habitats including well-drained upland sites on decomposed granite (e.g. the Moresby Range and near Coorow, Three Springs and Watheroo), poorly drained fresh-water seeps in sandy soils on upland sites (e.g. around Mindaloo Beacon) and low-lying drainage areas subject to salinisation (e.g. in the Binnu area). *E. diminuta* has a very scattered distribution, but can be locally common. Associated eucalypts include *E. accedens, E. blaxellii, E. eudesmioides – E. gittinsii* subsp. *illucida* intergrades, *E. horistes* (syn. *E. hypochlamydea*), *E. loxophleba, E. petraea* and *E. todtiana*. (Figure 1)

Conservation status. Using the Conservation Codes for Western Australian Flora, *E. sargentii* subsp. *fallens* is currently classified as Priority One and *E. diminuta* as Priority Three. With the synonymisation of these two taxa and the recent collections extending the range southerly, the conservation code applied to *E. diminuta* is amended to Priority Four: rare but not currently threatened.

Notes. There appear to be no consistent morphological differences between populations that have previously been attributed to either *E. diminuta* and *E. sargentii* subsp. *fallens*, including the types of both taxa. Brooker and Hopper (2002) distinguish *E. sargentii* subsp. *fallens* from their new species *E. diminuta* by the 'consistently smooth bark, slightly ribbed obtuse opercula, and occurrence on hills and breakaways'. Many individuals and whole populations of individuals previously attributed to *E. sargentii* subsp. *fallens* are smooth-barked, including those at the type population. Brooker and Hopper (2002), in their key including *E. sargentii* subsp. *fallens*, and Hill and Johnson (1992), both correctly state that rough bark is present at the base of larger individuals only. As for the opercula character differences, as stated below, a full range of variation exists that exhibits no strong correlation to habitat or distribution. The last difference Brooker and Hopper (2002) mention is not a morphological difference, and as mentioned above, arguably intermediate habitats are known for some populations. I cannot, therefore, reasonably maintain these two taxa as distinct entities, at least as previously circumscribed, and have synonymised *E. sargentii* subsp. *fallens* under *E. diminuta*.

There is some degree of population-based variation in the adult morphology of *E. diminuta*. Populations from the Moresby Range (including the type population) tend to be coarsest in buds and fruits and with more obtuse and striate opercula, while populations in the vicinity of Mindaloo Beacon tend to be less coarse and with more apiculate, smooth opercula. All other populations fit between these extremes. Despite the variability in adult morphology in *E. diminuta*, there appears to be no consistent correlation between morphology and habitat or distribution. In any case, this variability is considered relatively minor and barely worthy of taxonomic recognition, even if an ecological or geographical association with the variation is discovered. Seedling morphology throughout all the populations of *E. diminuta* grown (Binnu, Mindaloo Beacon, Moresby Range and Watheroo) is both very consistent and distinctive from that of *E. sargentii*.

The adult morphology of *E. diminuta* suggests is it most closely related to *E. sargentii*, while the seedling morphology places it closer to *E. stowardii*. *E. stowardii* is distinguished from *E. diminuta* (and

E. sargentii) by the broader and thicker, highly glossy adult leaves, the broader buds with more obtuse, ribbed opercula and the larger, slightly ribbed fruit. *E. stowardii* is restricted to well-drained upland sites on decomposed granite, with a widespread but very scattered distribution from near Morawa and Mt Gibson south to near Sandford Rock, north-east of Westonia.

Acknowledgments

I am indebted to Malcolm French for sharing his knowledge and accompaniment on field trips to assess variation in *E. diminuta* and *E. sargentii*.

References

Brooker, M.I.H. (2000) A New Classification of the Genus *Eucalyptus* L'Her. (Myrtaceae). *Australian Systematic Botany* 13, 79–148.

Brooker, M.I.H. and Hopper, S.D. (2002). Taxonomy of species deriving from the publication of *Eucalyptus* subseries *Cornutae* (Myrtaceae). *Nuytsia* 14(3): 325–360.

Hill, K. D. and Johnson, L.A.S. (1992). Systematic studies in the eucalypts. 5. New taxa and combinations in *Eucalyptus* (Myrtaceae) in Western Australia. *Telopea* 4(4): 561–634.

Nicolle, D. (2000). *Currency Creek Arboretum Eucalypt Research*. Vol. 1. (D. Nicolle: Adelaide).